

**DELTA PROTECTION COMMISSION**

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May 9, 1997

To: Delta Protection Commission

From: Margit Aramburu, Executive Director

Subject: Highlights of CALFED Draft Ecosystem Restoration Program Plan (ERPP)  
Executive Summary and Tables/Working Draft; April 8, 1997  
(For Commission Information Only)

Status:

On April 8, 1997, CALFED held a workshop to review portions of the ERPP. The complete ERPP has not yet been released. CALFED staff believes the ERPP will be released in June. At the workshop, the Executive Summary and drafts of two segments of the ERPP were distributed and discussed. The draft segments included the Sacramento River segment and the Delta segment.

The ERPP is designed to be implemented over a 25 year period. The ERPP would be implemented under the CALFED program as a common program; a program implemented with whatever storage and conveyance alternative is selected. Funds for implementation of the early phases of the ERPP include the Category III funds, Prop 204 funds, and federal funds.

The overall ERPP will include: Implementation Strategy, Ecosystem Visions, and Targets for the many Ecological Zones defined in the ERPP. The entire Legal Delta is defined as one Ecological Zone.

The intent of the ERPP is "to achieve ecosystem health; targets are flexible tools to guide the effort". One of the key components of the ERPP is the concept of "adaptive management" which includes "pragmatic adjustments to ecosystem targets, funding priorities, and restoration techniques to ensure that public and private resources are well spent and complement other related efforts".

Sacramento-San Joaquin Delta Ecological Zone Targets:

Attached is Table 2 which summarizes the Ecological Zone Targets for the Legal Delta. These Targets address acreage goals for restoring certain habitats in the Delta, and also include other targets which would not specifically impact land uses in the Delta Primary Zone. Within the

Legal Delta, targets are set for North Delta, East Delta, South Delta, and Central and West Delta (see map of the sub-areas of the Legal Delta prepared by Commission staff).

**Summary of Sacramento-San Joaquin Delta Ecological Zone Targets, as Described in Table 2 (attached):** NOTE: This list does not include all Ecosystem Elements or all Ecological Zone Targets listed in Table 2. Targets are to be implemented over a 25 year period.

**Natural Flood and Floodplain Processes:**

Expand the floodplain area in the North, East, South, and Central and West Delta ecological units by incorporating approximately 10% of leveed lands into the active floodplain of the Delta.

**Delta Channel Hydraulics:**

In the southern Yolo Bypass, restore 50 to 100 miles of tidal channels while maintaining or improving flood carrying capacity of the Yolo Bypass.

**Tidal Perennial Habitat:**

In the North, restore 1,500 acres of shallow-water habitat.

In the East, restore 1,000 acres of shallow-water habitat.

In the South, restore 2,000 acres of shallow-water habitat.

~~In the Central and West, restore 2,500 acres of shallow-water habitat.~~

In the Central and West, restore 500 acres of shoals in the westernmost portion.

**Nontidal Perennial Aquatic Habitat:** (within restored fresh emergent wetland habitats)

Develop 500 acres of deep open-water areas (greater than 4-6 feet deep).

Develop 1,500 to 2,000 acres of shallow open-water areas (less than 4-6 feet deep).

**Delta Sloughs:**

Restore ecological functions and physical structure of the Delta waterways network by increasing the land-water interface ratio to a minimum of 50 to 75% compared to 1906 conditions and by restoring 100 to 150 miles of small distributary sloughs hydrologically connected to larger existing Delta channels.

### **Midchannel Islands and Shoals:**

Maintain existing channel islands and restore 50-200 acres of high value islands in selected sloughs and channels in each of the ecological units (200 to 800 acres total).

### **Fresh Emergent Wetland Habitat:**

Increase **tidal** emergent wetland habitat by restoring 30,000 to 45,000 acres to tidal influence.

In the North and in the East, restore 1,000 acres of **nontidal** fresh emergent wetland.

In the South, restore 4,000 acres of **nontidal** fresh emergent wetland as part of a subsidence control program.

In the Central and West, restore 10,000 acres of **nontidal** emergent wetland as part of a subsidence program.

### **Seasonal Wetland Habitat:**

In the North, restore and manage at least 4,000 acres of additional seasonal wetland habitat and improve management of 1,000 acres of existing, degraded seasonal wetland habitat.

In the East, restore and manage at least 6,000 acres of additional seasonal wetland habitat and improve management of at least 1,000 acres of existing degraded wetland habitat.

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In the Central and West, restore and manage at least 8,000 acres of additional seasonal wetland habitat and improve management of 1,500 acres of existing degraded seasonal wetland habitat.

In the South, restore and manage at least 12,000 acres of additional seasonal wetland habitat and improve management of 500 acres of existing, degraded seasonal wetland habitat.

### **Riparian and Riverine Aquatic Habitat:**

In the South and along the San Joaquin River, restore 10-20 linear miles to create corridors of riparian vegetation of which 50% is greater than 75 feet in width, and 40% is no less than 300 feet wide and one mile in length.

In the South, restore 15-25 linear miles along other Delta island levees to create corridors of riparian vegetation of which 60% is more than 75 feet wide, and with 10% not less than 300 feet wide and one mile long.

In the North, East, and South, protect existing riparian woodlands.

#### **Perennial Grassland:**

In the North, East, and South, restore 4,000 to 6,000 acres of perennial grassland associated with existing or proposed wetlands and floodplain habitats.

#### **Agricultural Lands:**

Manage 40,000 to 75,000 acres of agricultural lands to maintain and improve wildlife habitat values.

Proposed Implementation as described in the DRAFT Segment on the Sacramento-San Joaquin Delta Ecological Zone (April 8, 1997): These are more specific suggestion of how and where to meet the targets outlined above. (NOTE: These are only some of the suggested programmatic actions included in the Delta Segment; others address water flows, etc).

#### **Natural Flood and Floodplain Processes:**

In the North, flood Little Holland, Liberty, and Prospect Islands; and convert small tracts along Snodgrass Slough to tidal wetland/slough complexes; and construct setback levees along Minor, Steamboat, Oxford and Elk Sloughs.

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In the East, construct setback levees along the South Mokelumne River and Beaver, Hog, and Sycamore Sloughs; and convert deeper subsided lands between dead-end sloughs east of the South Mokelumne River channel to overflow basins and non-tidal wetlands or lands designated for agricultural use; and remove levees in the headwater basins of Beaver, Hog and Sycamore Sloughs and allow these lands to be subject to flood overflow and tidal action.

In the South, construct setback levees along the San Joaquin River between Mossdale and Stockton; and convert adjacent land along the San Joaquin River between Mossdale and Stockton to overflow basins and nontidal wetlands or land designated for agricultural use.

In the Central and West, construct setback levees on corners of Delta islands.

### **Delta Channel Hydraulics:**

Reduce flows in selected channels by increasing cross-sectional areas of channels by using setback levees or by providing constrictions to flows into or out of the channels.

Restore 3,000 to 4,000 acres of tidal perennial aquatic habitat and 20,000 to 25,000 acres of tidally influenced freshwater marsh.

### **Aquatic, Wetland, and Riparian Habitats:**

#### **1. Tidal Perennial Aquatic Habitat:**

In the North, restore 500 acres of shallow-water habitat at Prospect Island, and restore 1,000 acres of shallow-water habitat in the south end of the Yolo Bypass.

In the East, restore 1,000 acres of shallow-water habitat at the eastern edge where land elevations range from 5 to 9 feet below mean sea level.

In the South, restore 2,000 acres of shallow water habitat where existing land elevations range from 5-9 feet below mean sea level.

In the Central and West, restore 2,500 acres of shallow water habitat where existing land elevations range from 5 to 9 feet below mean sea level. A program of fill replacement or longer term subsidence reversal may be needed to accomplish this action.

#### **2. Nontidal Perennial Aquatic Habitat:**

In the West and Central, develop 100 acres of deep (more than 4-6 feet) open-water areas within restored fresh emergent wetland habitats, such as on Twitchell or Sherman Islands; and develop 500 acres of shallow, open-water areas within restored fresh emergent wetland habitats..

In the East, develop 200 acres of deep (more than 4-6 feet) open-water acres within restored fresh emergent wetland habitats; and develop 300 acres of shallow, open water areas within restored fresh emergent wetland habitats..

In the South, develop 200 acres of deep (more than 4-6 feet) open-water areas within restored fresh emergent wetland habitats; and develop 300 acres of shallow, open water areas within fresh emergent wetland habitats.

In the North, develop 1,000 acres of shallow, open-water areas within restored fresh emergent wetland habitats.

**3. Delta Sloughs:**

In the Central and West, restore 20 miles of slough habitat in the short term and 50 miles in the long term.

In the North and East, restore 10 miles of slough habitat in the short term and 30 miles in the long term.

In the South, restore 25 miles of slough habitat and 50 miles in the long term.

In the North and East, restore tidal action to portions of islands and tracts with appropriate elevation, topography, and hydrogeomorphic conditions to sustain tidally influenced freshwater emergent wetland with 20 to 30 miles of narrow, serpentine shaped sloughs within the wetland and floodplain.

**4. Midchannel Islands and Shoals:**

Actively protect and improve existing channel islands in the Delta.

**5.. Fresh Emergent Wetland Habitat (Tidal):**

In the North, develop tidal wetlands on Prospect, Little Holland, and Liberty islands; and develop tidal wetlands on small tracts of converted leveed lands along Snodgrass Slough.

In the East develop tidal wetlands along the upper ends of dead-end sloughs.

~~Develop tidal wetlands along all setback levees and levees with restored riparian habitat.~~

**6. Fresh Emergent Wetland Habitat (Nontidal):**

In the Central and West, restore 10,000 acres of nontidal wetlands on Delta Islands; and on Twitchell Island, restore 1,000 acres of nontidal fresh emergent wetland.

In the North, in the Yolo Bypass, restore 1,000 acres of nontidal emergent wetland.

In the East, restore 1,000 acres of nontidal emergent wetlands in the leveed lands designated for floodplain overflow adjacent to Beaver, Hog and Sycamore Soughs.

In the South, restore 4,000 acres of nontidal emergent wetlands in lands designated for floodplain overflow.

**7. Seasonal Wetland Habitat:**

In the North, improve management of 1,000 acres of existing, degraded seasonal wetland habitat in the Yolo Bypass, and restore and manage 2,000 acres of additional seasonal wetland habitat in association with the Yolo Bypass Wildlife Area.

In the East, restore and manage 1,000 acres of additional seasonal wetland habitat on Canal Ranch.

In the Central and West, restore and manage 4,000 acres of additional seasonal wetland habitat on both Twitchell Island and Sherman Island.

Throughout the Delta, restore and manage an additional 20,000 to 30,000 acres of seasonal wetland habitat (wetlands can be developed on lands designated for floodplain expansion.)

**8. Riparian and Riverine Aquatic Habitat:**

In the North, obtain conservation easements, or purchase from willing sellers, land needed to restore 10 to 15 linear miles of riparian habitat along the Sacramento River.

In the East, obtain conservation easements, or purchase from willing sellers, land needed to restore 5 to 10 miles along the Mokelumne and 3 to 5 miles along the Cosumnes River to create corridors of riparian vegetation.

Obtain conservation easements for or purchase from willing sellers, land needed to restore riparian habitat along newly created sloughs and sloughs with new levee setbacks, and along new or upgraded Delta levees.

Expand the Stone Lakes and Cosumnes River Preserves from their current size by an additional 500 acres of existing woodland habitat; acquire fee title to the lands from willing sellers.

Purchase riparian woodland property or easements.

**Inland Dune Scrub:**

In the Central and West, protect and restore inland dune scrub habitat areas adjacent to existing ecological preserves through conservation easements or purchase from willing sellers.

**Perennial Grassland:**

Develop a cooperative program to restore 4,000 to 6,000 acres of perennial grassland through conservation easement or purchase from willing sellers.

#### **Agricultural Lands:**

Increase the area of winter and spring flooded corn fields and pastures in the Delta to provide high quality foraging habitat for wintering and migrating waterfowl and shorebirds, and other associated wildlife.

Periodically flood pasture from October to March in portions of the Delta relatively free of human disturbance to create suitable roosting habitat for wintering greater sandhill crane and other wintering sandhill crane subspecies.

Create permanent or semipermanent ponds in farmed areas of the Delta that provide suitable waterfowl nesting habitat, but lack suitable brooding habitat, to increase resident dabbling duck production.

Increase the acreage farmed for wheat and other crop types that provide suitable nesting habitat for waterfowl and other ground nesting species.

Convert agricultural lands from crop types that have relatively low forage value for wintering waterfowl, wintering sandhill cranes, and other wildlife to production of crop types that provide greater forage value.

Defer fall tillage on corn fields to increase the available forage for wintering waterfowl, wintering sandhill cranes, and associated wildlife.

Improve management on 8,000 acres of corn and wheat fields to leave a portion of the crop in each field unharvested to provide forage for waterfowl, sandhill cranes, and other wildlife.

#### **Water Diversions:**

Consolidate and screen agricultural diversions in the Delta.

#### **Levees, Bridges, and Bank Protection:**

Enter into agreements with willing reclamation districts to implement modified levee and berm vegetation management practices that promote establishment and maturation of shoreline riparian vegetation to restore and maintain the health of aquatic resources in and dependent on the Delta. Reimburse districts for any additional maintenance and inspection costs.

### **Dredging and Sediment Disposal:**

Use alternate sources (rather than Delta in channel sources) of levee maintenance material, such as excavation of abandoned nonessential levees, excavation material from the restoration of secondary tidal channels, dry-side island interior borrow pits, upland borrow sites, Cache Creek settling basin and Yolo Bypass sediment deposits, and deep water dredging sites in the San Francisco Bay.

Restrict or minimize effects of dredging activities near existing midchannel tule islands and shoals that are vulnerable to erosion and exhibit clear signs of area reduction in response to channel and bar incision.

Avoid dredging during spawning and rearing periods for delta smelt and rearing periods for winter-run chinook salmon.

Provide stockpiles of levee maintenance materials in three or more selected land side areas to avoid the need to obtain material from Delta channels during restricted periods.

### **Contaminants:**

Reduce the input of herbicides, pesticides, fumigants, and other agents toxic to fish and wildlife in the Delta by modifying land management practices and chemical dependency on 50,000 acres of urban and agricultural lands that drain untreated into Delta channels and sloughs. Actions will focus on modifying agricultural practices and urban land uses on a large scale basis. To reduce the concentration of pesticide residues, the amount applied will be reduced and the amount of pesticide load reaching the Delta's aquatic habitats will be further reduced by taking advantage of biological and chemical processes within wetland systems, which can help break down harmful pesticide residues.

### **Disturbance:**

In the Central and West, establish and enforce no wake zones of 1 to 3 miles in Disappointment Slough, 1 to 2 miles in White Slough, and 3 to 4 miles in Middle and Old Rivers in areas with remnant berms and midchannel islands.

In the East, establish and enforce no wake zones of 1 to 3 miles of the Mokelumne, 2 to 4 miles in Snodgrass Slough, and 3 to 4 miles in Beaver, Hog, and Sycamore Sloughs in areas with remnant berms and midchannel islands.

Establish and enforce no wake zones within 50 yards of important California black rail nesting areas from March to June.

Establish and enforce no motorized boating zones in 5 to 25 miles of existing dead-end channels from March to June.

Establish and enforce no motorized boating zone in the small tidal channels in restored tidal fresh emergent wetlands and Delta floodplains or levee setbacks.

[NOTE: Other topics not included here are: Central Valley Stream Temperatures, Water Diversions, Invasive Aquatic Plants, Invasive Riparian and Salt Marsh plants, Invasive Aquatic Organisms, Predation and Competition, and Harvest of Fish and Wildlife]

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DELTA PROTECTION ACT OF 1992

MAP OF ZONES

SACRAMENTO-SAN JOAQUIN DELTA

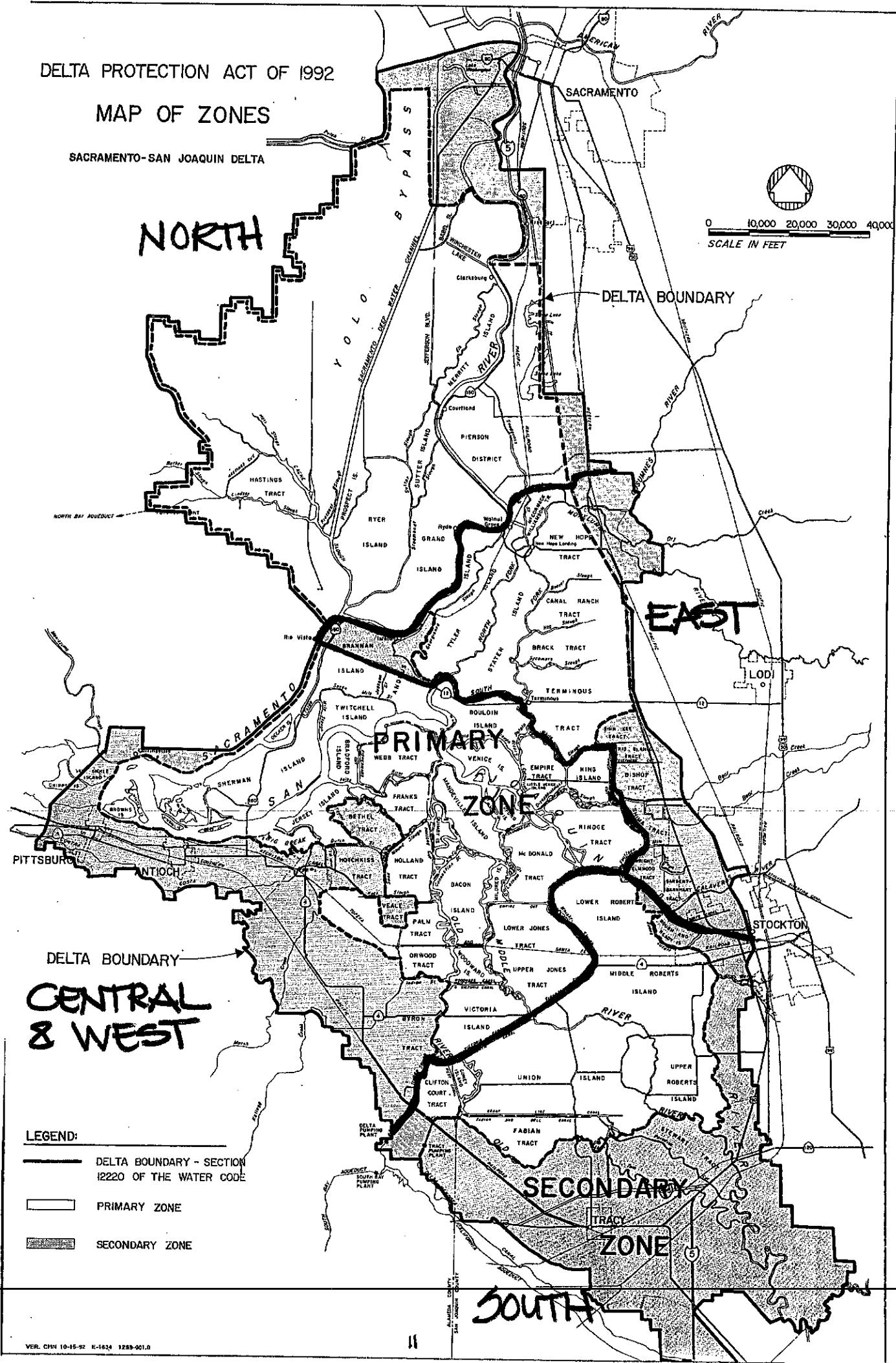


Table 2. Summary of Sacramento-San Joaquin Delta and Suisun Marsh/North San Francisco Bay Ecological Zone Targets.

Ecosystem Element	Sacramento-San Joaquin Delta Ecological Zone Targets	Suisun Marsh/North San Francisco Bay Ecological Zone Targets
<i>Implementation Objective: Restore basic features of the hydrograph in order to reactivate and maintain ecological processes and functions that create and maintain habitat required to sustain healthy fish, wildlife, and plant populations.</i>		
Central Valley Streamflows	<ul style="list-style-type: none"> <li>◆◆ Provide a March outflow that occurs from the natural late winter-early spring peak in inflow from the Sacramento River. The outflow should be at least 20,000 cfs for 10 days in dry years, at least 30,000 cfs for 10 days in below normal years, and 40,000 cfs for 10 days in above normal years.</li> <li>◆◆ Provide a late April-early May outflow that emulates the spring inflow from the San Joaquin River. The outflow should be at least 20,000 cfs for 10 days in dry years, 30,000 cfs for 10 days in below normal years, and 40,000 cfs for 10 days in above normal years.</li> <li>◆◆ Provide a fall or early winter outflow that emulates the first "winter" rain through the Delta.</li> <li>◆◆ Provide a minimum flow of 13,000 cfs on the Sacramento River below Sacramento in May of all but critical years.</li> </ul>	<ul style="list-style-type: none"> <li>◆◆ More closely emulate the natural pattern of seasonal freshwater inflow to North San Francisco Bay to transport sediments; allow upstream and downstream fish passage; contribute to riparian vegetation succession; permit transport of larval fish to the entrapment zone; maintain the entrapment zone in Suisun Bay; and provide adequate attraction flows for upstream, through-Bay migrating salmon. Delta outflow in dry and normal years will be improved by coordinating releases and natural flows in the Sacramento River to provide a March flow event of at least 20,000 cfs for 10 days in dry years, at least 30,000 cfs for 10 days in below normal years, and at least 40,000 cfs for 10 days in above normal years. The existing smaller, late-April and early-May flow event will be improved with additional releases of water from San Joaquin River and Delta tributaries to provide flows of magnitudes and durations similar to those prescribed for March.</li> </ul>

Notes: Target classification:

- ◆ =Targets for which additional research, demonstration and evaluation are needed to determine feasibility or ecosystem response.
- ◆◆ =Targets which will be implemented in stages with the appropriate monitoring to judge benefits and successes.
- ◆◆◆ =Targets that have sufficient certainty of success to justify full implementation in accordance with adaptive management, program priority setting, and phasing.



Table 2. Continued.

Ecosystem Element	Sacramento-San Joaquin Delta Ecological Zone Targets	Suisun Marsh/North San Francisco Bay Ecological Zone Targets
<i>Implementation Objective: Modify channel and basin configurations in order to improve floodplain function along rivers and streams in the Sacramento-San Joaquin Basin.</i>		
Natural Flood and Floodplain Processes	◆♦♦ Expand the floodplain area in the North, East, South, and Central and West Delta ecological units by incorporating approximately 10 percent of leveed lands into the active floodplain of the Delta.	Not applicable.
<i>Implementation Objective: Maintain, improve, and restore water temperature regimes in order to meet life history needs of aquatic organisms.</i>		
Central Valley Stream Temperatures	◆ More frequently achieve mean daily water temperatures between 60°F and 65°F in the Delta channels in spring and fall consistent with temperature needs for salmon and steelhead migrating through or rearing in the Delta.	Not applicable.

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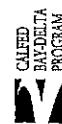


Table 2. Continued.

Ecosystem Element	Sacramento-San Joaquin Delta Ecological Zone Targets	Suisun Marsh/North San Francisco Bay Ecological Zone Targets
<i>Implementation Objective: Establish and maintain an hydraulic regime in the Bay-Delta in order to provide for migratory cues, create and maintain habitat, and facilitate species distribution and transport.</i>		
Delta Channel Hydraulics	<ul style="list-style-type: none"> <li>◆◆ Reestablish more natural internal Delta hydraulics in channels not designated to carry cross-Delta flow of water to south Delta pumping plants.</li> <li>◆◆ Maintain net downstream flows in the mainstem San Joaquin River from Vernalis to immediately west of Stockton during September through November to sustain oxygen levels sufficient for upstream migrating adult fall-run chinook salmon.</li> <li>◆◆ Restore 50 to 100 miles of tidal channels in the southern Yolo Bypass within the North Delta Unit while maintaining or improving flood carrying capacity of the Yolo Bypass.</li> </ul>	Not applicable.
<i>Implementation Objective: Maintain, improve, or restore the amounts of basic nutrients available to the foodweb of estuarine and riverine systems in order to provide a desirable level of foodweb productivity.</i>		
Bay-Delta Aquatic Foodweb	<ul style="list-style-type: none"> <li>◆◆ Increase primary and secondary productivity in the Delta to levels observed in the 1960s and early 1970s.</li> </ul>	None developed.

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Table 2. Continued.

Ecosystem Element	Sacramento-San Joaquin Delta Ecological Zone Targets	Suisun Marsh/North San Francisco Bay Ecological Zone Targets
<i>Implementation Objectives: Increase the area of shallow-water and intertidal mudflat habitat in order to improve conditions which support increased primary and secondary productivity; provide rearing, foraging, and escape cover for fish; and provide foraging and resting habitat for waterbirds.</i>		
Tidal Perennial Habitat	<ul style="list-style-type: none"> <li>◆◆ Restore 1,500 acres of shallow-water habitat in the North Delta Ecological Unit; 1,000 acres of shallow-water habitat in the East Delta Ecological Unit; 2,000 acres of shallow-water habitat in the South Delta Ecological Unit; and 2,500 acres of shallow-water habitat in the Central and West Delta Ecological Unit.</li> <li>◆◆ Restore 500 acres of shoals in the western-most portion of the Central and West Delta.</li> </ul>	<ul style="list-style-type: none"> <li>◆◆ Restore 1,500 acres of shallow-water habitat in the Suisun Bay and Marsh Ecological Unit, and restore 1,000 acres of shallow-water habitat in the San Pablo Bay Ecological Unit.</li> </ul>

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Table 2. Continued.

Ecosystem Element	Sacramento-San Joaquin Delta Ecological Zone Targets	Suisun Marsh/North San Francisco Bay Ecological Zone Targets
<p><i>Implementation Objectives: Increase the area of nontidal perennial aquatic habitats in the Delta in order to provide improved foraging and resting habitat for waterbirds, particularly for diving ducks, and which will help to restore and maintain the ecological health of the terrestrial and aquatic resources in and dependent on the Delta.</i></p>		
Nontidal Perennial Aquatic Habitat	<ul style="list-style-type: none"> <li>◆◆ Develop 500 acres of deep open-water areas (greater than 4-6 feet deep) within restored fresh emergent wetland habitats in the Delta.</li> <li>◆◆ Develop 1,500 to 2,000 acres of shallow, open-water areas (&lt;4-6 feet deep) in restored fresh emergent wetland habitat areas in the Delta.</li> </ul>	<ul style="list-style-type: none"> <li>◆◆ Develop 500 acres of deeper (3-6 feet deep) open-water areas in restored fresh emergent wetland habitats to provide resting habitat for water birds, foraging habitat for diving ducks and other water birds that feed in deep water, and habitat for associated resident fish species.</li> </ul>

*Implementation Objective: Protect and improve existing tidal slough habitat and restore a portion of the historical distribution of sloughs in the Bay-Delta within tidally influenced freshwater emergent wetlands, mudflats, and seasonal floodplains in order to restore and maintain the ecological health of the aquatic resources in and dependent on the Delta.*

Delta Sloughs	<ul style="list-style-type: none"> <li>◆◆ Restore ecological functions and physical structure of the Delta waterways network by increasing the land-water interface ratio to a minimum of 50-75 percent compared to 1906 conditions and by restoring 100 to 150 miles of small distributary sloughs hydrologically connected to larger existing Delta channels.</li> </ul>	<ul style="list-style-type: none"> <li>◆◆ Restore slough habitat for fish and associated wildlife species. Restore 5 miles of slough habitat in the near term and 10 miles in the long term in the Suisun Bay and Marsh Ecological Unit; restore 10 miles in the short term and 20 miles in the long term in the San Pablo Bay, Napa River, Sonoma Creek, and Petaluma River Ecological Units.</li> </ul>
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Table 2. Continued.

Ecosystem Element	Sacramento-San Joaquin Delta Ecological Zone Targets	Suisun Marsh/North San Francisco Bay Ecological Zone Targets
<i>Implementation Objectives: Protect and enhance existing remnant channel islands in the Delta that have the highest value and greatest chance to be maintained by the restored streamflow patterns, hydraulic conditions, sediment transport, and other ecosystem processes and functions in order to restore and maintain the ecological health of the aquatic resources in and dependent on the Delta.</i>		
Midchannel Islands and Shoals	◆◆ Maintain existing channel islands and restore 50-200 acres of high value islands in selected sloughs and channels in each of the Delta's ecological units (200 to 800 acres total).	Not applicable.
<i>Implementation Objective: Increase the area of saline emergent wetlands to provide high-quality habitat for waterfowl, shorebirds, and other associated wildlife; provide rearing habitat, foraging habitat, and escape cover for fish; and expand the populations and range of associated special-status and listed plant and animal species.</i>		
Saline Emergent Wetland Habitat	Not applicable.	◆◆ Restore tidal action to 5,000-7,000 acres in the Suisun Bay and Marsh Ecological Unit; 1,000-2,000 acres in the Napa River Ecological Unit; 500-1,000 acres each in the Sonoma Creek, Petaluma River, and San Pablo Bay Ecological Units.

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Table 2. Continued.

Ecosystem Element	Sacramento-San Joaquin Delta Ecological Zone Targets	Suisun Marsh/North San Francisco Bay Ecological Zone Targets
<p><i>Implementation Objective: Increase the area of fresh emergent wetland by restoring tidally influenced fresh emergent wetland in the Delta to provide high-quality habitat for waterfowl, shorebird, and other associated wildlife, providing rearing, foraging, and escape cover for fish; and expanding the populations of an range of special-status and listed plant and animal species to assist in their eventual recovery.</i></p>		
Fresh Emergent Wetland Habitat	<ul style="list-style-type: none"> <li>◆ Increase existing tidal emergent wetland habitat in the Delta by restoring 30,000-45,000 acres to tidal influence.</li> <li>◆◆ Restore 1,000 acres of nontidal fresh emergent wetland in both the North and East Delta Ecological Units; restore 4,000 acres of nontidal fresh emergent wetland in the South Delta Ecological Unit as part of a subsidence control program; and restore 10,000 acres of nontidal emergent wetland in the Central and West Delta Ecological Unit as part of a subsidence program.</li> </ul>	<p>None developed.</p>

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Table 2. Continued.

Ecosystem Element	Sacramento-San Joaquin Delta Ecological Zone Targets	Suisun Marsh/North San Francisco Bay Ecological Zone Targets
<p><i>Implementation Objective: Restore and manage seasonal wetland habitat in the Delta to restore and maintain the ecological health of the aquatic resources in and dependent on the Delta; restore foodweb and floodplain processes; reduce the effects of contaminants and water management on the Delta's aquatic resources; and provide high-quality foraging and resting habitat for wintering waterfowl, greater sandhill cranes, and migrating shorebirds.</i></p>		
Seasonal Wetland Habitat	<p>◆◆ Restore and manage at least 4,000 acres of additional seasonal wetland habitat and improve management of 1,000 acres of existing, degraded seasonal wetland habitat in the North Delta Ecological Unit; restore and manage at least 6,000 acres of additional seasonal wetland habitat and improve management of 1,000 acres of existing degraded seasonal wetland habitat in the East Delta Ecological Unit; restore and manage at least 8,000 acres of additional seasonal wetland habitat and improve management of 1,500 acres of existing, degraded seasonal wetland habitat in the Central and West Delta Ecological Unit; restore and manage at least 12,000 acres of additional seasonal wetland habitat and improve management of 500 acres of existing, degraded seasonal wetland habitat in the South Delta Ecological Unit.</p>	<p>◆◆◆ Restore and manage 3,000 acres of additional seasonal wetland habitat and improve management of 1,000 acres of existing, degraded seasonal wetland habitat in the Suisun Bay and Marsh Ecological Unit. Restore and manage 2,000 acres of additional seasonal wetland habitat and improve management of 1,000 acres of degraded seasonal wetland habitat in the San Pablo Bay Ecological Unit.</p> <p>◆◆◆ Protect and manage 500 to 1,000 acres of vernal pools in the Suisun Bay and Marsh Ecological Unit that provide suitable habitat for listed fairy shrimp species, the Delta green ground beetle, and special-status plant species to assist in the recovery of those species.</p>

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Table 2. Continued.

Ecosystem Element	Sacramento-San Joaquin Delta Ecological Zone Targets	Suisun Marsh/North San Francisco Bay Ecological Zone Targets
<i>Implementation Objective:</i> Restore riparian scrub, woodland, and forest habitat along largely unvegetated riprapped banks of Delta island levees, along the Sacramento and San Joaquin Rivers, and along major tributaries of the Sacramento and San Joaquin Rivers in order to create corridors of riparian vegetation to provide shaded riverine aquatic cover for anadromous and other fish species, and to create high-quality habitat for associated special-status plant and animal species, and other associated wildlife.		
Riparian and Riverine Aquatic Habitat	<ul style="list-style-type: none"> <li>◆◆ Restore 10-20 linear miles along the San Joaquin River and in the South Delta Ecological Unit to create corridors of riparian vegetation of which 50 percent is greater than 75 feet in width and 40 percent is no less than 300 feet wide and 1 mile in length. Restore 15-25 linear miles along other Delta island levees throughout the South Delta Ecological Unit to create corridors of riparian vegetation of which 60 percent is more than 75 feet wide, with 10 percent not less than 300 feet wide and 1 mile long.</li> <li>◆◆ Protect existing riparian woodlands in the North, East, and South Delta Ecological Units.</li> </ul>	<ul style="list-style-type: none"> <li>◆◆ Restore 10 to 15 linear miles of riparian and shaded riverine aquatic habitat along corridors of riparian scrub and shrub vegetation each in the Suisun Marsh and Bay, Napa River, Sonoma Creek, and Petaluma River ecological units, of which 60 percent is more than 15 years wide and 25 percent is no less than 5 yards wide and 1 mile long.</li> </ul>
<i>Implementation Objective:</i> Improve low- to moderate-quality Antioch inland dune habitat in the Delta in order to provide high-quality habitat for special-status plant and animal species and other associated wildlife populations.		
Inland Dune Scrub	<ul style="list-style-type: none"> <li>◆◆ Improve 50-100 acres of low- to moderate-quality Antioch inland dune scrub habitat.</li> </ul>	Not applicable.

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Table 2. Continued.

Ecosystem Element	Sacramento-San Joaquin Delta Ecological Zone Targets	Suisun Marsh/North San Francisco Bay Ecological Zone Targets
<i>Implementation Objective: Preserve and restore perennial grassland habitat in conjunction with restoration of floodplain riparian and valley oak habitats in order to provide high-quality habitat conditions for associated special-status plant species and wildlife.</i>		
Perennial Grassland	◆◆ Restore 4,000 to 6,000 acres of perennial grassland in the North, East, and South Delta Ecological Units associated with existing or proposed wetlands and floodplain habitats.	◆◆◆ Restore 1,000 acres of perennial grassland each in the Suisun Marsh and Bay, Napa River, Petaluma River, and Sonoma Creek ecological units in association with existing or proposed wetlands.
<i>Implementation Objective: Co-manage agricultural upland and wetland habitat in order to provide wildlife forage and resting area habitat values for wintering and migrating waterfowl, shorebirds, and other associated wildlife in the Delta.</i>		
Agricultural Lands	Manage 40,000 to 75,000 acres of agricultural lands to maintain and improve wildlife habitat values.	◆◆◆ Manage 5,000 to 10,000 acres of agricultural lands to maintain and improve wildlife habitat values.
<i>Implementation Objective: Reduce entrainment of aquatic organisms and nutrients at to increase survival of juvenile fish and maintain foodweb.</i>		
Water Diversions	◆◆ Reduce loss of important fish at diversions.	◆◆◆ Reduce entrainment losses of juvenile fish at agricultural, power plant, and managed wetland diversions by 25-50 percent.

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Table 2. Continued.

Ecosystem Element	Sacramento-San Joaquin Delta Ecological Zone Targets	Suisun Marsh/North San Francisco Bay Ecological Zone Targets
<i>Implementation Objective: Reestablish natural vegetation along artificially confined channel reaches, consistent with flood protection needs and new levee vegetation management guidelines approved by the Reclamation Board.</i>		
Levees, Bridges, and Bank Protection	<ul style="list-style-type: none"> <li>◆◆ Increase shoreline and floodplain riparian habitat in the Delta by modifying current vegetation management practices on both the water and land side of berms on 25-75 miles of the Sacramento, Mokelumne, and San Joaquin rivers, and on 25-100 miles of other Delta channels and sloughs confined by levees</li> </ul>	None developed.
Dredging and Sediment Disposal	<p><i>Implementation Objective: Reduce loss and degradation of important aquatic habitat and vegetated berm islands caused by dredging activities. Reduce impacts of dredging activities on aquatic resources during key spawning and rearing periods and in sensitive areas for aquatic resources to protect, restore, and maintain the health of aquatic resources in and dependent on the Delta.</i></p> <ul style="list-style-type: none"> <li>◆◆ Limit dredging in channel zones that are not essential for flood conveyance or maintenance of industrial shipping pathways, and avoid dredging activities in shallow water areas except where it is needed to restore flood conveyance capacity.</li> <li>◆◆ Avoid dredging during spawning and rearing periods for delta smelt and rearing periods for winter-run chinook salmon.</li> </ul>	None developed.

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Table 2. Continued.

Ecosystem Element	Sacramento-San Joaquin Delta Ecological Zone Targets	Suisun Marsh/North San Francisco Bay Ecological Zone Targets
<i>Implementation Objective: Reduce adverse effects of invasive non-native aquatic plants to increase and maintain the productivity of the aquatic foodweb, preserve suitable fish habitat structure, and provide quality habitat conditions for native submergent and emergent plants.</i>		
Invasive Aquatic Plants	<ul style="list-style-type: none"> <li>◆◆ Manage existing and restored dead-end and open-ended sloughs and channels so that less than 1 percent of the surface area of these sloughs and channels are covered by invasive non-native aquatic plants.</li> <li>◆ Reduce the potential for introduction of non-native aquatic plant and animal species at border crossings.</li> </ul>	<ul style="list-style-type: none"> <li>◆◆ Manage existing and restored dead-end and open-ended sloughs and channels so that less than 1 percent of the surface area of these sloughs and channels are covered by invasive non-native aquatic plants.</li> <li>◆ Reduce the potential for introduction of non-native aquatic plant and animal species at border crossings.</li> </ul>
<i>Implementation Objective: Reduce populations of invasive non-native tree and shrub species that compete with the establishment and succession of native riparian vegetation.</i>		
Invasive Riparian and Salt Marsh Plants	<ul style="list-style-type: none"> <li>◆ Reduce surface area covered by exotic plants to less than 1 percent.</li> <li>◆◆ Reduce the invasive non-native woody species, such as giant reed (Arundo or false bamboo) and eucalyptus, that compete with native riparian vegetation by reducing the areal extent of exotics by 50 percent.</li> </ul>	<ul style="list-style-type: none"> <li>◆◆ Reduce the area covered by invasive non-native woody species, such as giant reed and eucalyptus, that compete with native riparian vegetation by reducing the areal extent of exotics by 50 percent, and eradicate invasive woody plants from restoration areas.</li> </ul>

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Table 2. Continued.

Ecosystem Element	Sacramento-San Joaquin Delta Ecological Zone Targets	Suisun Marsh/North San Francisco Bay Ecological Zone Targets
<i>Implementation Objective: Reduce introductions of non-native aquatic organisms that compete or displace native species.</i>		
Invasive Aquatic Organisms	◆◆ Reduce or eliminate the introduction of non-native species from ship ballast water.	◆◆ Reduce or eliminate the introduction of non-native species from ship ballast water.
<i>Implementation Objective: Reduce the loss of juvenile anadromous and resident fish and other aquatic organisms from unnatural levels of predation in order to increase survival and contribute to the restoration of important species.</i>		
Predation and Competition	◆◆◆ Reduce predation on juvenile fish in Clifton Court Forebay.	None developed.
<i>Implementation Objective: Reduce concentrations and loadings of contaminants in the aquatic environment and the subsequent bioaccumulation by aquatic species in order to increase survival and eliminate public health concerns.</i>		
Contaminants	◆◆ Reduce loading, concentrations, bioaccumulation of contaminants in tissues of fish and wildlife of concern by 25 to 50 percent as measured against current average levels, and the accumulation in the water and sediments in the Delta Ecological Zone.	◆◆ Reduce the input of herbicides, pesticides, fumigants, and other agents toxic to fish and wildlife.

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Table 2. Continued.

Ecosystem Element	Sacramento-San Joaquin Delta Ecological Zone Targets	Suisun Marsh/North San Francisco Bay Ecological Zone Targets
<i>Implementation Objective: Reduce the current level of harvest of fish and wildlife in order to restore and maintain the ecological health of the aquatic resources and wildlife in and dependent on the Delta.</i>		
Harvest of Fish and Wildlife	◆ Reduce illegal harvest of wildlife and anadromous fish in the Delta.	◆ Reduce illegal harvest of anadromous fish and waterfowl in the Suisun Marsh and North San Francisco Bay.
<i>Implementation Objective: Reduce the potentially adverse effects of stocking artificially produced fish throughout Central Valley rivers and streams in order to increase the survival of naturally produced fish and contribute to long-term restoration goals.</i>		
Artificial Production of Fish	None developed	◆◆ Limit supplementation of striped bass to life stages and numbers that minimize the rate of predation on juvenile anadromous and estuarine fish.
<i>Implementation Objective: Reduce human activities that adversely affect wildlife behavior or cause habitat destruction in order to increase spawning success and contribute to restoration of important species.</i>		
Disturbance	◆◆◆ Reduce boat traffic and boat speeds in areas where levees or channel islands and their associated shallow water and riparian habitat are susceptible to wake damage.	◆◆◆ Reduce boat wakes near California clapper and black rail nesting areas in Suisun Marsh and San Francisco Bay from March to June to prevent destruction of nests and to assist in the recovery of these listed species.

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